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(54) Title: A FEED COMPOSITION FOR YOUNG ANIMALS (57) Abstract The present invention relates to a feed-stuff for young animals, particularly piglets, to be administered during the first weeks of life and comprising starch, vitamins, and minerals, whereby it has a composition which in general resembles the composition of the mother milk with regard to the ratio of casein to whey proteins, that the lactose contents has been adopted to the lactose content of the mother milk, that the starch present is gelatinized and is substantially free of fibers and other mineral and trace substance binding carbohydrate complexes, and that it contains organic, acidifying compounds to maintain a low pH in the stomach.		

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A FEED COMPOSITION FOR YOUNG ANIMALS

DESCRIPTIONTechnical field

5 The present invention relates a starting feed-stuff for young animals, particularly for piglets, but also for ruminants and deer, to be added during the first weeks of their lives, typically from the age of one week to four weeks.

10 The object of the present invention is to obtain a starting feed-stuff intended for young animals, particularly piglets, by means of which feed-stuff, administered when the animals are one to four weeks old, only, one stimulates the animal to an early feed-stuff intake and thereby promotes the animal's own
15 production of particularly protein and starch reducing enzymes.

Another object of the present invention is further to obtain a starting feed-stuff which by means of its composition, function and physical shape is particularly suited as carrier for vitamins, carbohydrates, different proteins with the aim of increasing the immunological status, fat, minerals, micro nutrients,
20 such as iron, probiotics, such as positively acting bacteria, and antibacterial substances.

25 A further object of the present invention is to obtain a starting feed-stuff which by means of an ideal composition and taste, without then disturbing the gastro-intestinal functions of the animals is consumed at an early stage by the piglets, whereby the affliction on the mother animal can be reduced by reduced demands for milk production, and thereby the mother animal
30 can better maintain its body weight and nutritional-physiological status.

Background of the invention

35 It is commonly known that piglets during their early growth and weaning period in many cases are caught by disastrous diarrhoea conditions. These conditions are many times caused by the inability of the animals to assimilate nutritional elements

from the intestine whereby undigested nutrients will end up in the large intestine, where they are a substrate for an undesired intestinal bacterial flora.

5 The total mortality including dead born piglets in a Swedish and international pig breeding is today as high as 20 to 25%. Many of these piglets are also prior to their death the object of an intense care as they already at birth has under weight and e.g. iron anaemia. Problems that causes a bad start of li-
10 fe. The lack of iron, which is caused by the rapid growth of the pig and the low contents of iron in the sow milk can partly be compensated for by iron injections, but partly these are costly, partly the effect is not particularly durable. To add adequate amounts of iron orally to the piglets at an early
15 stage is thus a great demand, the problem is to get the piglets to consume this iron in quantities large enough, without disturbing the other gastro-intestinal functions of the animals. Adding to this is the problem that under-weight and anaemic piglets very often refuse to eat additional feed-stuff and the-
20 reby the introduction and the consumption of more iron rich feed-stuffs is further delayed. Moreover, the health status of the mother animal is further afflicted by a prolonged sucking.

Different additional feed-stuffs have been proposed to increase
25 the palatability and to increase the administration of iron via these. Thus diets based on oat flakes are often a palatable source which the piglets accepts. Oat flakes alone, however, do not provide a balanced feeding status. and, moreover, the fytin content makes e.g. the iron resorption more difficult. Additio-
30 nal feed-stuffs based on cereal grains are thus from this point of view unsuitable as carriers of iron preparations

Description of the present invention

It has now surprisingly been found possible to be able to eli-
35 minate these problems by means of the present invention which is characterized in that the starting feed-stuff has a composition which in general resembles the composition of the mother

milk with regard to the ratio of casein to whey proteins, and that the starch present is gelatinized and is substantially free of fibers and other mineral and trace substance binding carbohydrate complexes, and that it contains organic, acidifying compounds to maintain a low pH in the stomach.

Further characteristics are evident from the accompanying claims.

10 The content of organic, acidifying compounds to maintain a relatively low pH in the stomach is citric acid or lactic acid or another organic acid obtained by *Lactobacillus* or other similar acid forming bacteria which grow on a substrate containing i.a. lactulose to promote the survival of these lactobacillae.

15 The starting feed-stuff should as a rule not contain any larger amounts of saccharides of the type which can not be resorbed in the upper gastro-intestinal tract.

20 Further the feed-stuff should not contain more than 0.3% of Na.

In order to guarantee a complete resorption the feed-stuff may, if it is so deemed necessary, contain carbohydrate digesting enzymes such as cellulases, amylases, lactase, or proteolytic enzymes in order to facilitate the digestion of proteins in the intestine.

30 One part of the feed-stuff consists of a particular base of the feed-stuff which base is a fraction of casein and whey proteins having been digested by *Lactobacillus*. The digestion/acidification hereby takes place at pH 5.8 for a time period of normally 4 to 10 hrs at a temperature of 37 to 45°C.

35 The invention will be described more in detail with reference to the Examples given however, without being restricted thereto.

EXAMPLE 1

First a base was prepared which base consisted of

40 % of whey

2 % of dry yeast (proteins, nutritional salts, vitamins)

5 5-8 % of sodium and/or potassium caseinate

50 % of fat (tallow, lard, rape oil, soya oil, or a mixture thereof)

q.s. antioxidants (to protect the fat present)

which base, with the exception for the fat content, is first

10 subjected to a fermentation in the presence of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* to pH 5.8 for a time period of 6 hrs at a temperature of 42°C. The acidified casein-whey part was spray-dried and the fat above was added thereto. The fat is hereby bound into the casein-whey powder to the formation of a substantially dry base.

60 % of the above base

10 % of vegetabilic proteins (from potato or carbohydrate freed soya)

20 10 % of animalic protein

5-15 % of gelatinized starch

1 % of wheat germs

1 % of citric acid

1 % of lyzed yeast

25 1 % of dextrose

3 % premix (vitamins, minerals, trace elements, probiotics, lactulose, and carrier)

were dry mixed and shaped into granules or pellets having a size of 2 to 5 mm and a length of 3 to 10 mm.

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These granules or pellets are administered ad libitum to the resting place of the piglets and have thereby turned out to be well accepted, whereby the time for introduction and consumption of the ordinary feed-stuff for piglets has been able to be made one or two weeks earlier. The result has further been a considerable reduction in the number of appearing diarrhoeas. A positive lowering of the pH in the stomach at an early age has

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further been observed. A low pH in the stomach is important to stop unsuitable bacteria to pass through the stomach and thereby cause diarrhoea.

- 5 The iron content is preferably in the form of iron sulphate, but also other iron compounds, such as EDTA-iron can be used.

EXAMPLE 2

- 10 A feed-stuff for young calves was prepared in accordance with the following formula;

34.0 % of fat (tallow, lard, rape oil, soya oil, or a mixture thereof)

2.0 % of starch

27.0 % of skim milk powder

- 15 18.0 % of desalted whey powder

11.5 % of Na-caseinate

6.0 % of potato protein

1.5 % of premix of vitamins and minerals

- 20 The ingredients were carefully mixed and pelletized. The final feed-stuff contains 32% of protein, 35 % of fat, 20% of lactose, and 0% of fibers.

- 25 The feed-stuff not be pelletized if the animals are very young as the feed-stuff can then be added in the form of an aqueous suspension to a dry solids content of 12%.

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EXAMPLE 3

A feed-stuff for young deer was prepared in accordance with the following formula:

24.0 % of fat (tallow, lard, rape oil, soya oil or a mixture thereof).

12.5 % of skim milk powder

20.5 % of egg yolk powder

26.0 % of desalted whey

2.0 % of starch

14.0 % of Na-caseinate

1.0 % of premix of vitamins and minerals

The ingredients were carefully mixed and pelletized. The composition of the feed-stuff was 32% of proteins, 36% of fat, 15% of lactose, and 0% of fibers.

The feed-stuff for young deer need not necessarily be pelletized but can be administered as a powder suspended in water to a dry solids contents of 20%.

CLAIMS

1. Starting feed-stuff to be administered to young animals, particularly piglets, ruminants, and deer during the first weeks of life and comprising starch, vitamins, and minerals,
5 characterized in that the starting feed-stuff has a composition which in general resembles the composition of the mother milk with regard to the ratio of casein to whey proteins, that the lactose contents has been adopted to the lactose content of the mother milk, that the starch present is gelatinized and is sub-
10 stantially free of fibers and other mineral and trace substance binding carbohydrate complexes, and that it contains organic, acidifying compounds to maintain a low pH in the stomach, whereby the ratio casein to whey protein is 1:5-8, and whereby the feed-stuff at a suspension in water gives a pH of 5.8 or more.
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2. Starting feed-stuff according to claim 1, characterized in that casein and whey proteins are present in the form of spray dried product having been fermented with lactic acid producing bacteria.
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3. Starting feed-stuff according to claim 2, characterized in that the product has been provided with fat in the relationship 1:1(casein/whey:fat).
- 25 4. Starting feed-stuff according to claim 1-3, characterized in that it contains about 24 % of whey proteins, about 3-5 % casein, about 30 % of fat, about 10 % of a vegetabilic protein, about 10 % animalic protein, about 5-15 % of gelatinized starch, about 1 % citric acid, about 1 % of lyzed yeast, about
30 1 % of dextrose, and about 3 % of vitamins and minerals.
5. Starting feed-stuff according to claim 2, characterized in that the casein/whey proteins are fermented using *Lactobacillus bulgaricus* and *Streptococcus thermophilus*.
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INTERNATIONAL SEARCH REPORT

International Application No PCT/SE89/00148

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC ⁴		
A 23 K 1/18, A 23 C 11/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC 4	A 23 K; A 23 C	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
SE, NO, DK, FI classes as above.		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	EP, A1, 0 241 097 (COÖPERATIEVE CONDENS-FABRIEK "FRIESLAND" W.A.) 14 October 1987 See the examples page 10 and claims 1,3-5,7 & NL, 8600874	1-5
X	DE, A1, 2 948 150 (MEGGLE MILCHINDUSTRIE GMBH & CO KG) 19 June 1981 See the claims and examples & EP, 0029937 AT,E, 7842	1,3
X	GB, A, 2 022 392 (MEGGLE MILCHINDUSTRIE GMBH & CO KG) 19 December 1979 See claim 1 & FR, 2427792 AT, 361768	1
<p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
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Swedish Patent Office	Inga-Karin Petersson	